Firearms/Toolmarks Discipline
Preparing, Reviewing, and Providing Results

1 Purpose

This document specifies the Firearms/Toolmarks Discipline (FTD) requirements for preparing, reviewing, and providing a contributor with a *Laboratory Report* and/or *i3 Product* to conform to the requirements of the FBI Laboratory Quality Assurance Manual and Laboratory Operations Manual.

2 Scope

This procedure applies to authorized FTD personnel in the Firearms/Toolmarks Unit (FTU) and Scientific & Biometrics Analysis Unit/Toolmark Group (SBAU/TG) who handle evidence, perform examinations, complete verifications and reviews, and issue results.

3 Report Language and Issuing *Laboratory Reports*

3.1 A *Laboratory Report* is an official report that presents case-related information to a contributor regarding FBI Laboratory work. *Laboratory Reports* generated in the FTD will contain the required information as described in the *LOM - Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA)* or the *LOM - Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases*, as appropriate. The language used in *Laboratory Reports* will be consistent with the *FTD Report Language (Appendix A)*, except when warranted by specific examination circumstances. When issuing a *Laboratory Report*, the appropriate LOM Practices will be followed.

3.2 The *FTD Report Language* (*Appendix A*) outlines the corresponding report language, methods, and limitations for common examination types. If an examination is performed in the FTD and a methods and limitations statement does not exist, the Examiner will confer with the FTD Technical Leader. This consultation will be recorded in the Communication Log.

3.2.1 If a methods and limitations statement for an examination performed contains information not applicable to an examination on a case, the unrelated portion may be redacted.

3.3 When more than one methods and limitations statement appears in the *Laboratory Report*, a header will be inserted for each examination that is referenced.

3.4 When reporting a pattern and/or fracture conclusion, the *Laboratory Report* will contain a statement referencing the applicable Department of Justice Uniform Language for Testimony and Report (ULTR) document.

4 Issuing Investigative Lead, Intelligence, or Information (i3) Products

4.1 An *i3 Product* is a simplified reporting product produced in lieu of a *Laboratory Report*. These products are intended for intelligence, information, and/or investigative leads only and are not intended for adjudication purposes. *I3 Products* generated in the FTD will contain the information as described in the *LOM – Practices for Providing Investigative Lead, Intelligence, or Information (i3) Products* and be supported through examinations utilizing FTD Technical Procedures.

4.1.1 An *i3 Product* can be utilized in the FTD when the contributor is not requesting information for the purpose of a legal proceeding. All *i3 Products* will have the required statement as written in the *FTD i3 Product Form* (Appendix C).

4.2 The summary of results will be recorded on the *FTD i3 Product Form* (Appendix C). Case records that support the summary of results recorded on the *FTD i3 Product Form* must be sufficient in detail that, without the benefit of the item and/or information itself, other authorized personnel can understand what was being examined and how the conclusion was reached.

4.2.1 Case records for *i3 Products* must be sufficient in detail that in the event a *Laboratory Report* (7-1, 7-1 LIMS) must be issued and/or testimony provided, the following can be supplied:

- Case records
- Verification records, where applicable
- Applicable FTD methods and limitations statements approved at the time the *i3 Product* was issued
- Applicable ULTR and/or Approved Standards for Scientific Testimony and Report Language (ASSTR) for the discipline

4.3 All *i3 Products* will be reviewed by authorized personnel prior to their release.

4.3.1 A review of an *i3 Product* will evaluate the case records and other supporting information utilized to form the conclusions contained in the product. This review will be recorded and consists of determining whether the appropriate assessments have been performed, and whether the conclusions are consistent with the recorded data and within the scope of the discipline.

4.3.2 The review will be recorded in FA. If the *i3 Product* is classified, then the reviewer(s) must be an approver in Sentinel. All reviews will be serialized in Sentinel.

4.4 All *i3 Products* and their associated records will be maintained within the Case ID Number that is established for the submission and serialized in Sentinel.

4.5 All *i3 Products* will be tracked within the established discipline Case ID.

5 Technical and Administrative Review

5.1 When conducting technical and administrative reviews, the *LOM - Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA)* or the *LOM - Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records for Legacy Cases*, as appropriate, will be followed.

5.1.1 When an Examiner submits a *Laboratory Report* and supporting examination and administrative records for technical review, the Examiner is prohibited from acquiring these records back from the technical reviewer until the review is completed or returned to the Examiner for editing.

5.2 Technical Review

5.2.1 Examinations conducted in the FTD will be technically reviewed by another Examiner who is qualified and authorized in the applicable discipline/subdiscipline and who has at least three months of FTD casework experience in the FBI Laboratory. Technical reviews will not be conducted by the Examiner who authored the examination records or the *Laboratory Report*. If necessary, the technical reviewer can review the evidence to ensure the completeness of the examination record. Absent an operational need (i.e., case priority, remaining examinations, etc.), the evidence will be retained by the Examiner until completion of the Technical Review.

5.2.2 The technical reviewer will complete the designated portion of the FTD Technical and Administrative Review Form (*TARF)* for both FA and legacy casework during the review. Questions on the *TARF* requiring a response applicable to FA casework will be completed; the remaining fields pertaining to legacy casework will have "NA" selected unless the case is a legacy case. During the technical review, comments or required feedback may be recorded in the 'feedback' window of the review screen in FA or on the *TARF.*

5.2.2.1 If the technical reviewer determines that a question(s) on the *TARF* must be answered with a "N/No" the technical reviewer will circle that response at the time of the review.

5.2.2.1.1 If a "N/No" response is recorded on the *TARF* and/or another inconsistency is noted in the examination records by the technical reviewer, the technical reviewer will return the completed *TARF* and the examination records to the Examiner for possible revision. For FA cases, the reviewer will mark the review as 'Returned' in FA.

5.2.2.2 If the Examiner agrees with the technical reviewer, the Examiner will make the necessary changes, single strike-out, date and initial the examination records, and return them to the technical reviewer. For FA cases, the Examiner will mark the review as 'Continued' in FA.

5.2.2.2.1 If the Examiner chooses to reprint a page(s) of the notes due to corrections, the original page(s) with the completed corrections must be retained as part of the examination records in order to track the changes.

5.2.2.3 Once the necessary changes have been made to the case file, the technical reviewer will single strike-out, date and initial the original "N/No" response on the *TARF* and circle "Y/Yes" to indicate the correction has been made. For FA cases, the reviewer will select 'pass' in FA to mark the review as 'Completed'.

5.2.2.4 If the Examiner does not agree with the technical reviewer, the Examiner will discuss the topic(s) with the technical reviewer to reach an agreement. If an agreement is reached the technical reviewer will single strike-out, date and initial the original "N/No" response on the *TARF* and circle "Y/Yes." If agreement cannot be reached between the Examiner and the technical reviewer, the LOM *Practices for Resolution of Scientific or Technical Disagreement* will be followed.

5.2.3 For legacy cases, when the technical reviewer determines the examination records are complete with no inconsistencies, the technical reviewer will indicate approval by signing the last page of the file copy of the *Laboratory Report*, on the technical review line. At this point, the examination records review can proceed to section 5.3 for administrative review.

5.3 Administrative Review

5.3.1 To ensure the accuracy and completeness of the *Laboratory Report*, all examination and administrative records will be administratively reviewed by authorized personnel. Administrative reviews will not be conducted by the Examiner(s) who authored the *Laboratory Report.*

5.3.2 The administrative reviewer will complete the designated portion of the *TARF* for both FA and legacy casework during the review. Questions on the *TARF* requiring a response applicable to FA casework will be completed; the remaining fields pertaining to legacy casework will have "NA" selected unless the case is a legacy case. During the administrative review, comments or required feedback may be recorded in the 'feedback' window of the review screen in FA or on the *TARF.*

5.3.2.1 If the administrative reviewer determines that a question(s) on the *TARF* must be answered with a "N/No," the administrative reviewer will circle that response at the time of the review.

5.3.2.1.1 If an unsatisfactory response is recorded on the *TARF* or another inconsistency is noted in the case file by the administrative reviewer, the completed *TARF* and case file will be returned to the Examiner for possible revision. For FA cases, the administrative reviewer will mark the review as 'Returned' in FA.

5.3.2.2 If the Examiner agrees with the administrative reviewer, the Examiner will make the necessary changes to the case file and return it to the administrative reviewer. For FA cases, the Examiner will mark the review as 'Continued' in FA.

5.3.2.3 If the necessary changes have been made to the case file, the administrative reviewer will single strike-out, date and initial the original "N/No" response and circle "Y/Yes" to indicate the correction has been made. For FA cases, the administrative reviewer will select 'pass' to mark the review as 'Completed' in FA.

5.3.2.4 If the Examiner does not agree with the administrative reviewer, the Examiner will discuss the topic(s) with the administrative reviewer to reach an agreement. If the discussion involves a technical matter, the Technical Leader may be called upon for assistance. If an agreement is reached the administrative reviewer will single strike-out and initial the original "N/No" response and circle "Y/Yes".

5.3.3 For legacy cases, when the administrative reviewer determines the examination and administrative records are complete with no inconsistencies, the administrative reviewer will indicate approval by signing the last page of the file copy of the *Laboratory Report*, on the administrative review line.

6 Field Examination Reviews

6.1 For trajectory examinations, a *Laboratory Report* may be prepared and will be technically and administratively reviewed.

6.2 If circumstances require an FD-302 or other forms of communication be drafted in the field or prior to the issuance of a *Laboratory Report*, the *LOM - Practices for Preparing, Reviewing, and Issuing Laboratory Reports and Retaining Records in Forensic Advantage (FA)* will be followed.

6.2.1 The contents of such communications will set forth the activities of the Laboratory Shooting Reconstruction Team and are intended for investigative guidance purposes only.

6.2.2 These communications will not contain technical opinions.

7 References

Association of Firearm and Tool Mark Examiners (AFTE) Journals, July 1992, Vol. 24, No. 3 and Fall 2011, Vol. 43, No. 4.

Fact Sheet – eTrace: Internet-Based Firearms Tracing and Analysis. Retrieved from the ATF website: https://www.atf.gov/resource-center/fact-sheet/fact-sheet-etrace-internet-based-firearms-tracing-and-analysis. Web. Accessed 3 March 2021.

FBI Laboratory Quality Assurance Manual, latest revision.

FBI Laboratory Operations Manual, latest revision.

Glossary of the Association of Firearm and Tool Mark Examiners, AFTE Training and Standardization Committee, 6th Edition, Version 6.030317.1.

"SWGGUN Admissibility Resource Kit (ARK)" Resources, The Association of Firearm and Tool Mark Examiners. Web. Accessed 7 March 2021.

United States. Department of Justice. Office of Legal Policy. Forensic Science. (2020, August) *Department of Justice Uniform Language for Testimony and Reports for the Forensic Firearms/Toolmarks Discipline – Fracture Examination*. Retrieved from the Department of Justice Web site: https://www.justice.gov/olp/page/file/1284761/download

United States. Department of Justice. Office of Legal Policy. Forensic Science. (2020, August) *Department of Justice Uniform Language for Testimony and Reports for the Forensic Firearms/Toolmarks Discipline – Pattern Examination*. Retrieved from the Department of Justice Web site: https://www.justice.gov/olp/page/file/1284766/download

Rev. #	Issue Date	History
0	03/02/20	Original issue for Firearms/Toolmarks Discipline, which includes the Firearms/Toolmarks Unit and Scientific and Biometrics Analysis Unit/Toolmark Group. Portions of an existing document (*FTD Case Assignment, Records, Report Writing and Review, Rev 14, 02/13/2019*) were excerpted or modified to create this document. Minor changes for grammar and clarity were made throughout the document and sections were re-numbered. Section 3.4 was modified to allow for laboratory macro to be used in place of web address. Section 4.2.2.2.1 was added. Association Examinations were re-titled to Physical and Visual Evaluations. Section 6 References updated. Report writing language was added/modified where needed (Physical and Visual Examinations, Firearms Function Examinations). Additional edits for ANAB compliance. General format update to Appendix B Technical & Administrative Review Form.
1	04/15/21	Section 1 edited to include i3 products; Removed the word 'match' in Section 3.4 to comply with ULTRs; Report writing language and Methods/Limitations for Fracture Examinations and Pattern Examinations updated to remove 'match' and to comply with newest DOJ ULTRs; clarification made to Section 3.4 as to when ULTR reference is necessary; Section 4 regarding i3 products added; Section 6 regarding Field Examination Reviews edited to reflect current FTD language and practices for reporting information; added report writing language for Physical and Visual Examinations, for examinations of items bearing extrusion marks, and for physical assessments of metals; combined methods and limitations statements for Bullet Examinations, Cartridge / Shotshell Case Examinations, and Toolmark Examinations into one statement "Pattern Examinations", with addition of VCM language to the limitations; added report writing language, methods, and limitations for Laminate Glass examinations; Shooting Incident Reconstruction updated to Trajectory Examinations; updated Administrative Statements to remove references to amended and supplemental reports, and replaced with 'follow up' reporting; removed introductory sentence for Legacy reporting; Updated titles and web site links for the ULTR statements in the references; removed reference to NCIC; removed references to EFP examinations; grammatical edits throughout to include the Appendices; Updated 5.2.1 regarding maintaining evidence until technical review is completed.

Redacted - Signatures on File

Approval

Firearms/Toolmarks
Acting Unit Chief — Date: 04/15/2021

Scientific & Biometrics
Analysis Unit Chief — Date: 04/15/2021

Firearms/Toolmarks
Technical Leader — Date: 04/15/2021

QA Approval

Quality Manager — Date: 04/15/2021

Appendix A: *FTD Report Language*

- Accidental Discharge
- Physical and Visual Examination
- Barrel & Overall Length Measurement
- Bullet Testing Kit
- Ejection Pattern
- eTrace
- Firearms Function
- Fracture Examination
- General Rifling Characteristics
- Gunshot Residue and Shot Pattern Examination
- Laminate Glass Examination
- NIBIN
- Pattern Examination
- Reference Ammunition File
- Serial Number Restoration
- Silencer/Suppressor
- Tools
- Trajectory Examination
- Administrative Section (Follow Up and Introduction sentences)
- Remarks Section (Defensive Systems Unit and Discontinuation)

Accidental Discharge (Results)

Negative Result

[#] is a 20 gauge Jing An (China) shotgun, Model SPM-20, Serial Number [#]. The [#] shotgun functioned normally when tested in the Laboratory and could not be made to fire without a pull of the trigger.

Positive Result

[#] is a 20 gauge Jing An (China) shotgun, Model SPM-20, Serial Number [#]. During testing in the Laboratory, the [#] shotgun could be made to fire without a pull of the trigger.

Accidental Discharge (Methods & Limitations)

Methods:

Accidental Discharge

An accidental discharge test is conducted in all modes of fire for a firearm, utilizing a primed cartridge case or shotshell case. The firearm is struck with a rawhide or similar styled mallet on its six planes: front of muzzle, butt plate, top of breech and chamber, bottom of trigger guard and frame and both sides of the receiver/frame. If necessary, tests can be undertaken in order to attempt to duplicate the conditions under which the firearm discharged.

Limitations:

Accidental Discharge

When an accidental discharge examination is performed, it may not be possible to recreate or duplicate all of the circumstances which led to the discharge of a firearm without a pull of the trigger.

Physical and Visual Examinations– Ammunition/General (Results)

[#] consists of [number] [caliber] cartridges that [are loaded with bullet type and] bear the headstamp of [name] ammunition and are physically consistent with functional ammunition.

[#] consists of [number] [caliber] cartridges that bear the headstamp of [name] ammunition and is physically consistent with functional ammunition.

[#] is a [caliber] cartridge that is physically consistent with functional ammunition.

The [#] is labeled with the trade names "[name]" and "[name]" and contains fifteen 9mm Luger (9x19mm) cartridges, all of which bear the headstamp of [name] and have design characteristics that are physically consistent with functional ammunition sold under these trade names. [#] are 9mm Luger (9x19mm) cartridges that also bear the headstamp of [name]. [#] are physically consistent with functional ammunition and bear all of the same observable design characteristics as the cartridges in the [#] box; however, there is no method of determining whether or not the [#] originated in the [#] box.

Due to the agreement of class characteristics and the presence and alignment of similar post-manufacture features, Item [ ] and Item [ ] are physically consistent with having been part of the same object. However, due to a lack of suitable fractured surfaces, it could not be determined if the items were joined at one time.

Item [#] and Item [#] are physically consistent with one another with respect to [list observed properties of the two items that are consistent].

Item [#] [piece of metal] is physically consistent with [type of metal]. This determination is made based on the appearance and magnetic properties of Item [#] and is not the result of chemical or metallurgical testing. If additional information is desired as to the composition of Item [#], a metallurgical examination should be requested.

Item [#] is physically consistent with the [object/tool] sold under the [distributor/manufacturer name] trade name.

Item [#] is physically consistent in regard to [list observed properties] as [product name] found at supply stores such as [list store names].

Physical and Visual Examinations – Ammunition/General (Methods & Limitations)

Methods:

Physical and Visual Examinations

Physical and visual evaluations compare the physical and class characteristics of evidence items. A conclusion of “physically consistent with” is reached if the observable or measurable physical dimensions and/or design features of two items are in agreement or are "physically consistent." If these dimensions and features are clearly different, an elimination conclusion is reached. If there is a lack of observable design features or measurable dimensions, the result is inconclusive.

Limitations:

Physical and Visual Examinations

A Physical and Visual Evaluation examination is unsuitable for determining a source identification conclusion. A conclusion of "physically consistent with" signifies a restricted group source, based on class characteristics and/or observable features, from which evidence may have originated. Post-manufacture features cannot be used for elimination purposes.

Physical and Visual Examinations – Electronic Evidence (Results)

Photographs

[#] is a compact disc that contains bank surveillance photographs. An object depicted in image 180211.tif, is consistent with a dark colored pistol. An object depicted in image 180155.tif, is consistent with a silver-colored revolver. Due to inadequate image quality, no further information could be obtained from the images from the [#] compact disc.

OR

The object depicted in the [#] physically consistent with the [model(s)] pistols/revolvers/rifles/shotguns manufactured by [name].

Physical and Visual Examinations – Electronic Evidence (Methods & Limitations)

Methods:

Physical and Visual Examinations – Electronic Evidence

The physical characteristics of an unknown object depicted in a photograph and/or electronic media are compared to known reference materials to determine if there are any consistencies.

Limitations:

Physical and Visual Examinations – Electronic Evidence

Due to poor image quality or a lack of observable physical characteristics, it may not be possible to determine if an object depicted in a photograph is a functional firearm, a replica firearm, or a toy firearm.

Examinations of electronic evidence may be impacted by data quality and size of the item(s) in question.

Barrel Length and Overall Length Measurement (Results)

The barrel of the [#] rifle was examined and determined to have been shortened to a length of [0.00] inches (+/- [0.00] inches, k=3 for a 99.73% confidence level).

The overall length of the [#] shotgun is [0.00] inches (+/- [0.00] inches k=3 for a 99.73% confidence level).

Examination of the [#] rifle determined that the barrel had been shortened making the overall length [0.00] inches (+/- [0.00] inches k=3 for a 99.73% confidence level).

Barrel Length and Overall Length Measurement (Methods & Limitations)

Methods:

Barrel Length and Overall Length Measurement

Barrel length is measured using a ruler or measuring rod and overall length of a firearm is measured using a measuring platform with a ruler. The rulers and measuring rods are traceable to a National Institute of Standards and Technology (NIST) standard.

Limitations:

Barrel Length and Overall Length Measurement

The accuracy of barrel length and overall length measurements are limited by the straightness of the measuring device, the ability to delineate the furthest point of a barrel in relation to the measuring device, proper alignment of the firearm in the measuring platform, environmental conditions, and the measuring ability of the person making the measurement.

Bullet Testing Kit (Results)

Positive

A presumptive chemical test for the presence of lead and copper was performed on [#]. The test was positive for both lead and copper.

Negative

A presumptive chemical test for the presence of lead and copper was performed on [#]. The test was negative for both lead and copper.

Positive/Negative

A presumptive chemical test for the presence of lead and copper was performed on [#]. The test was [positive/negative] for lead and [positive/negative] copper.

Bullet Testing Kit (Methods and Limitations)

Methods:

Bullet Testing Kit

Suspected bullet impacts or holes are examined visually and/or microscopically for the presence of physical effects that might have been produced by a bullet. If these conditions are noted, a series of presumptive chemical tests for the presence of lead and copper may be performed. Each of these tests is chemically specific and produces a colored reaction when in the presence of the specific chemical.

Limitations:

Bullet Testing Kit

Presumptive chemical tests are not conclusive and are meant to provide additional information regarding the possibility of a bullet impact or passage. The presumptive test does not distinguish whether lead and copper are deposited by a bullet or by another source.

Ejection Pattern (Results)

Ejected cartridge cases from the [#] pistol were found to strike the ground [0.00] feet (+/- [0.00] ft., k=3 for a 99.73% confidence level) to the right and [0.00] feet (+/- [0.00] ft., k=3 for a 99.73% confidence level) to the front of the [#] ejection port.

Ejection Pattern (Methods & Limitations)

Methods:

Ejection Pattern

The floor/ground is marked with two intersecting lines that form a coordinate axis. The firearm is fired from a position directly above the origin. The point of each cartridge case's first impact with the floor/ground is marked for each shot that is fired. When the test firing has concluded, all of the markers are measured for their position from the axis. These measurements are used to calculate an average point of impact on both axes as well as the uncertainty.

Limitations:

Ejection Pattern

Several conditions (orientation of the firearm when fired, walls or intervening objects, floor or ground surface variability, inadvertent movement of cartridge cases by first responders) may affect the final location of fired cartridge cases at a shooting scene. The test results are only valid for the firearm tested along with the magazine and type of ammunition used.

eTrace (Results)

eTrace submission by FTU

An eTrace request was submitted using the serial number from the [#] [type] and the results can be found under the Trace number [#].

eTrace (Methods & Limitations)

Methods:

eTrace

The make, model, serial number from a firearm, to include other investigative information, is submitted to the Department of Justice electronic tracing system (eTrace) internet-based database. Firearm tracing can provide systematic tracking information of a recovered firearm from its manufacturer or importer to its point(s) of purchase and recovery.

Limitations:

eTrace

The eTrace database will only return a firearms trace report if the information about the recovered firearm is available.

Firearms Function (Results)

Functionality

Item [#] is a .223 Remington caliber Colt rifle, Model [#], which functioned normally when tested in the Laboratory with the submitted magazine.

Item [#] is a 9x19mm Glock pistol, Model [#], which functioned normally when tested in the Laboratory using the [#] magazine.

Item [#] is a .357 Magnum caliber Smith & Wesson revolver, Model [#], which functioned normally when tested in the Laboratory.

Functionality with use of RFC

[#] is a .40 S&W caliber Hi-Point pistol, Model JCP, which functioned normally when tested in the Laboratory using a magazine from the Reference Firearms Collection.

80% frame and/or receiver

Item [#] is a .40 S&W caliber pistol using a [Manufacturer e.g., Polymer 80] frame, Model [#], and a Glock 22 slide and barrel. The frame is consistent with unfinished or "80%" frame commercially produced by the [Manufacturer e.g., Polymer 80 Company] and are manufactured without a serial number.

Item [#] is a [caliber] "80 %" rifle, which functioned normally when tested in the Laboratory with the submitted magazine. Examination of the Item [#] rifle determined the upper receiver was manufactured by [Manufacturer e.g., Del-Ton Inc.] located in [city, state] and the lower receiver was manufactured by [Manufacturer i.e., Polymer 80] Model [#] located in [city, state]. The "80%" refers to an item that has not reached a stage of manufacture that meets the definition of a firearm frame or receiver and is designed to be completed by the purchaser. Additionally, "80%" lower receivers, such as the one on the Item [#] rifle, are not serialized.

Firearms Function (Methods & Limitations)

Methods:

Firearms Function

The make, model, and caliber of a firearm are normally determined by directly observing manufacturer markings on the firearm in question. When these are not present, published materials and firearms in the Laboratory's Reference Firearms Collection may be used to make determinations.

Unless otherwise noted, submitted firearms are test fired:

1) in the condition they are received in the Firearms/Toolmarks Unit,
2) with ammunition from the Laboratory's Reference Ammunition File,
3) in a manner that allows for testing of available modes of fire such as manual safety engaged, manual safety disengaged, single action, double action, semi-automatic, fully automatic, etc.

Limitations:

Firearms Function

The results of firearms function examinations describe the operating condition of the firearm as received in the Firearms/Toolmarks Unit.

Fracture Examinations (Results)

Fracture Fit – Comparative Microscopy

Through a fracture examination, utilizing comparative microscopy, it was determined that the Item [#] piece of hasp and the Item [#] piece of hasp were once joined.

Fracture Fit - Physical Fit

Through a fracture examination, utilizing physical fit evaluation, it was determined that the Item [#] piece of hasp and the Item [#] piece of hasp were once joined.

Inconclusive – Fracture Fit

A fracture fit examination of the [#] piece of screwdriver and [#} was inconclusive, due to a lack of sufficient corresponding microscopic marks of value.

Inconclusive – Physical Fit

A physical fit examination of the [#] piece of screwdriver and [#} was inconclusive, due to a lack of sufficient corresponding microscopic marks of value.

Exclusion – Fracture Fit

Due to a difference in the class characteristics [e.g., size and shape] of the material, the Item [#] piece of screwdriver and the Item [#] screwdriver were excluded as having been joined at one time.

Exclusion – Physical Fit

Through fracture examination, utilizing physical fit evaluation, it was determined that the Item [#] piece of hasp and Item [#] piece of hasp were not originally connected due to a difference in class characteristics.

Fracture Examination (Methods & Limitations)

Methods:

Fracture Examination

Fracture examinations undergo two stages of comparison. First, the fractured items are examined to determine and compare their class characteristics. The class characteristics of marks on fractured items include, but are not limited to, the shape and size of the material. If the class characteristics of the fractured items are not clearly different, the examination moves to a second stage where the fractured items are examined utilizing physical fit evaluation and/or comparative microscopy to determine if the fractured items were joined at one time.

The comparison examination consists of an evaluation of the fracture marks/contours present in two items to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued:

1) Exclusion

Exclusion is an Examiner's conclusion that two or more fractured items do not physically fit together. The basis for an 'exclusion' conclusion is an Examiner's opinion that the observed class characteristics and/or corresponding individual characteristics of the two or more fractured items provide extremely strong support for the proposition that the fractured items do not physically fit together and extremely weak or no support for the proposition that the fractured items physically fit together.

2) Fracture Fit

Fracture Fit is an Examiner's conclusion that two or more fractured items were once part of the same object. This conclusion is an Examiner's opinion that all observed class characteristics are in agreement and the quality and quantity of corresponding individual characteristics for the fractures is such that the Examiner would not expect to find that same combination of individual characteristics repeated in another object and insufficient disagreement in corresponding individual characteristics to conclude they originated from different objects. This conclusion can only be reached when two or more fractured items physically fit together or when a comparison of the corresponding surfaces of the fractured items reveals a fit. The basis for a fracture fit conclusion is an Examiner's opinion that the observed class characteristics and corresponding individual characteristics of the two or more fractured items provide extremely strong support for the proposition that they were once part of the same object and extremely weak support for the proposition that the fractured items originated from different objects. Before being reported, a fracture fit conclusion requires a verification to be completed.

3) Inconclusive (No Conclusion)

Inconclusive is an Examiner's conclusion that no determination can be reached as to whether two or more fractured items could have originated from the same object. The basis for an inconclusive conclusion is an Examiner's opinion that there is an insufficient quantity and/or quality of observed characteristics to determine whether two or more fractured items could have originated from the same object. Reasons for an inconclusive conclusion include the presence of physical or microscopic similarity that is insufficient to form the conclusion of fracture fit; a lack of any observed similarity; or physical or microscopic dissimilarity that is insufficient to form the conclusion of exclusion.

Limitations:

Fracture Examinations

Fracture Examination is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to corrosion and abuse, fracture/contour marks created from the fracture of an object are not always identifiable as such.

General Rifling Characteristics (Results)

[#] is a .40 caliber/10mm [bullet type] that was fired from a barrel rifled with six grooves, right twist. A check of the FBI Laboratory's General Rifling Characteristics (GRC) database produced a list of [firearm type] with GRCs like those present on the [#] that includes pistols marketed by [manufacturer] and revolvers marketed by [manufacturer].

General Rifling Characteristics (Methods & Limitations)

Methods:

GRC

The appropriate GRC measurements are entered in the database, which then returns a list of all firearms in the database with compatible GRCs.

Limitations:

GRC

The GRC database contains information obtained from firearms at the FBI Laboratory and from voluntary submissions of test-fired specimens from law enforcement agencies around the world. It is not a comprehensive list of all firearms and contains no information about the numbers of each type of firearm present in the general population. The firearms listed in the

report are typically those considered to be more common and are included at the discretion of the examiner authoring the report.

Gunshot Residue and Shot Pattern Examination (Results)

Negative Results

The [#] shirt was microscopically examined and chemically processed for gunshot residues, and none were found.

Bullet wipe

The [#] shirt was microscopically examined and chemically processed for gunshot residues. Lead and/or copper residues consistent with the passage of a bullet were found surrounding a hole below the right front pocket of the shirt. No other residues were detected.

Negative Griess, positive particulate lead or copper (bullet hole optional)

The [#] shirt was microscopically examined and chemically processed for gunshot residues. Particulate lead and/or copper residues consistent with the discharge of a firearm were found on the collar of the shirt, but these residues are unsuitable for muzzle-to-target distance determinations. No other residues were detected.

Positive Griess but no pattern, no vaporous lead or copper

The [#] shirt was microscopically examined and chemically processed for gunshot residues. Nitrite residues were found near a hole below the right front pocket of the shirt, but a muzzle-to-target range could not be determined due to the lack of a measurable pattern of deposition. However, during testing of the [#] pistol and the [#] through [#] cartridges in the Laboratory, nitrite residues were only deposited at a muzzle-to-target distance of less than five feet. No other residues were detected.

Positive Griess but no pattern, no vaporous lead or copper, no firearm/cartridges

The [#] shirt was microscopically examined and chemically processed for gunshot residues. Nitrite residues were found near a hole below the right front pocket of the shirt, but a muzzle-to-target range could not be determined due to the lack of a measurable pattern of deposition. Please note that residues like those found on the [#] shirt are rarely deposited at a distance of six feet or greater. No other residues were detected.

Positive results, no Griess pattern but with vaporous lead or copper

The [#] shirt was microscopically examined and chemically processed for gunshot residues. Nitrite and vaporous lead and/or copper residues were found near a hole below the right

front pocket of the shirt. These residues were compared to residues present on test-fired exemplars produced using the submitted firearm and ammunition at a variety of muzzle-to-target distances. The residues present on the [#] shirt could only be duplicated at a distance of twenty-four inches or less. No other residues were detected.

Positive results, no Griess pattern but with vaporous lead or copper, no firearm/cartridges

The [#] shirt was microscopically examined and chemically processed for gunshot residues, and vaporous lead and/or copper residue deposits were found. Although a muzzle-to-target distance could not be determined, it should be noted that residues like those found on the [#] shirt are rarely deposited at a distance of twenty-four inches or greater. No other residues were detected.

Positive and reproducible Griess pattern

The area around the hole in the [#] shirt was microscopically examined and chemically processed for the presence of gunshot residues, and a pattern of Nitrite and lead/copper residues was found. The pattern of residues present on the [#] shirt was reproduced at a muzzle-to-target range of greater than eight and less than sixteen inches when using the submitted [#] pistol and [#] through [#] cartridges. No other residues were detected.

Contact Shot

The area around the hole in the [#] shirt was microscopically examined and chemically processed for gunshot residues, and Nitrite/lead/copper residues were found these residues and physical effects are consistent with the muzzle of the firearm being in contact or near contact with the [#] shirt.

Shot Pattern

The [#] metal panel bears a pattern of nine distinct impact marks that is typical of damage created by buckshot pellets. The pattern of impact marks present on the [#] metal panel was reproduced at a muzzle-to-target range of greater than twenty-four feet and less than thirty-two feet when using the submitted [#] shotgun and the [#] through [#] shotshells.

Gunshot Residue and Shot Pattern Examination (Methods & Limitations)

Methods:

<u>Gunshot Residue</u>

Items submitted for gunshot residue testing are examined visually and microscopically for the presence of suspected bullet holes, physical effects from a firearm discharge such as singeing or tearing of fabric, and embedded particles of gunpowder, lead, and copper. If some or

all these conditions are noted, a series of chemical tests for the presence of nitrites (a component of gunpowder), lead, and copper may be performed. Each of these tests are chemically specific and produce a color reaction when in the presence of the specific chemical. The tests used for nitrite compounds, lead, and copper are the Modified Griess Test, the Sodium Rhodizonate Test, and the Dithiooxamide Test, respectively.

If a suspect firearm and ammunition are submitted, test-fired exemplars are created at a variety of muzzle-to-target distances, are visually examined and chemically processed in the same manner as the evidence, and are compared directly with the submitted evidence. When test results at specific distances are distinctly different than the results on the submitted evidence, this is used as the basis for excluding an appropriate range of distances ("could not be reproduced at a distance of four inches or less").

When no suspect firearm and/or ammunition is submitted, results are more general and are based on common maximum distances for the deposition of gunshot residues ("residues like those found on the [Item #] are rarely deposited at a distance of six feet or greater").

If the only reaction produced in testing is a small ring of lead and/or copper around a suspected bullet hole, this is considered consistent with the passage of a bullet, but no distance determination can be made.

Shot Pattern Testing

Items submitted for shot pattern testing are initially examined for physical effects consistent with the discharge of shot pellets. If these effects are found and a suspect firearm and shotshells have been submitted, test-fired exemplars are created at a variety of muzzle-to-target distances. These test patterns are compared directly with the pattern present on the submitted evidence. When the test patterns at specific distances are distinctly different than the pattern on the submitted evidence, this is used as the basis for excluding an appropriate range of distances.

Limitations:

Gunshot Residue

While firearms are known to produce consistent gunshot residue pattern results under controlled conditions, variables including shooting environment, barrel condition and ammunition design can all influence the results of tests conducted on the submitted evidence and test-fired exemplars. Accordingly, gunshot residue test results are primarily used to exclude particular muzzle-to-target ranges and should only be considered valid for the particular combination of firearm and ammunition type used during testing in the Laboratory. The use of the phrase "consistent with" in this report is meant to indicate physical effects that are commonly found in a given shooting environment. No conclusions can be drawn when residues are absent due to the possibility of intervening objects or environmental and handling conditions.

When a bullet impacts an intervening object, vaporous lead residue deposits can be produced that are occasionally dispersed onto neighboring items.

Distance determinations involving a wound and/or injury are outside the scope of this procedure.

Shot Pattern Testing

While shotguns are known to produce consistent shot pattern results under controlled conditions, variables including barrel length, barrel choke and shotshell design can all influence the size and distribution of shot patterns present on the submitted evidence and test-fired exemplars. Accordingly, shot pattern test results are primarily used to exclude particular muzzle-to-target ranges and should only be considered valid for the particular combination of shotgun and type of shotshell used during testing in the Laboratory.

Distance determinations involving a wound and/or injury are outside the scope of this procedure.

Laminate Glass Examination (Results)

Bullet Hole Sequence within Groups

Group []: Due to radial crack intersection, it was determined that Hole [] occurred before Holes [], the sequence for Holes [] had no associations.

Group []: Due to interference and conflicting intersecting fractures, a sequence between Hole [] and Hole [] could not be determined.

Bullet Hole Sequence between Groups

Hole [] occurred before Hole [] due to a radial crack intersection.

Laminate Glass Examination (Methods & Limitations)

Methods:

Laminate Glass Examination

Laminate glass is a type of safety glass designed to remain intact when impacted or perforated. The glass is constructed using two or more plates of glass bonded to an inner layer of polyvinyl. When shattered, the glass cracks producing radial and concentric fractures from the origin of impact or perforation. Both radial and concentric fractures can occur on a single or several layers of laminate glass from one projectile.

Laminate glass examination for shot sequence requires a physical and/or visual evaluation of the radial fractures from the location of intersections. When a radial fracture encounters a preexisting radial fracture, it is prevented from propagating due to the preexisting fissure. This intersection indicates the shot sequence with the preexisting fracture occurring before the intersecting fracture.

Laminate Glass Examination for Direction

Glass examination for directionality requires a physical and/or visual evaluation of the perforation for a fracture cone. The fracture cone is a tapered contour created around the exit side of the perforation.

Limitations:

Laminate Glass Examination Shot Sequence

Fractures can continue to propagate after an impact or perforation due to changes in temperature and/or stress from the movement of laminate glass. This can result in a fracture intersection which is not a result of shot sequence. Due to proximity of impacts or perforations, intersecting fractures may not be readily apparent.

Laminate Glass Examination

Due to the proximity of perforations or impacts, the contour for the fracture cone may be readily apparent.

NIBIN (Results)

NIBIN – No Association, test fire

Images of a test-fired specimen from the [Item # firearm type] were entered into the National Integrated Ballistic Information Network (NIBIN) and searched within the zone(s) that includes [state]. No associations were found at this time.

NIBIN - Association

Images of a test-fired specimen from the [Item # firearm type] were entered into the National Integrated Ballistic Information Network (NIBIN) and searched within the zone(s) that includes [state]. An image of a cartridge case from the [Item # firearm type] is similar to an image that was entered in connection with [originating agency, case number]. This evidence needs to be submitted to the Laboratory for a direct comparison to determine if an association exists with the [Item # firearm type].

NIBIN – No Association, evidence cartridge case

Images of the [Item # cartridge case] were entered into the National Integrated Ballistic Information Network (NIBIN) and searched within the zone(s) that includes [state]. No associations were found at this time.

NIBIN – Association, evidence cartridge case

Images of the [Item # cartridge case] were entered into the National Integrated Ballistic Information Network (NIBIN) and searched within the zone(s) that includes [state]. An image of the [Item # cartridge case] is similar to an image that was entered in connection with [originating agency, case number]. This evidence needs to be submitted to the Laboratory for a direct comparison to determine if an association exists with the [Item # cartridge case].

NIBIN – No entry

A National Integrated Ballistic Information Network (NIBIN) search was not conducted due to revolver-type cartridge case images not being entered into the database.

A National Integrated Ballistic Information Network (NIBIN) search was not conducted due to bullet images not being entered into the database.

A National Integrated Ballistic Information Network (NIBIN) search was not conducted due to [caliber] cartridge cases not normally being entered into the database.

NIBIN (Methods and Limitations)

Methods:

NIBIN

When a NIBIN entry is performed for a submitted firearm, an image of a test-fired cartridge case from that firearm is entered in the NIBIN database. An image of a representative sample of any submitted cartridge cases that have not been associated with a specific firearm are also entered in the NIBIN system. Entries are searched against the appropriate regional database(s), and correlation results are viewed to determine possible associations.

Limitations:

NIBIN

Due to a number of variables regarding image capture and data entry, NIBIN searches may not always locate entries that were fired in the same firearm.

Additionally, the algorithm used in NIBIN merely provides a sorting capability for potentially associated toolmarks represented on cartridge cases and provides no statistical confidence in possible matching results.

Pattern Examination (Results)

Identification

The [#] bullet was identified as having been fired from the barrel of the [#] pistol.

The [#] cartridge case was identified as having been fired in the [#] pistol.

Toolmarks present on the [#] hasp were identified as having been produced by the [#] bolt cutters.

Toolmarks present on the [#] and [#] bearing balls were identified as having been produced by the same tool.

[#] through [#] are drill bits bearing a symbol associated with the trade name Vermont American. The [#] drill bit was identified as having created the toolmarks present on the [#] padlock.

Inconclusive

A pattern examination of the Item [#} bullet and Item [#] pistol was inconclusive due to a lack of sufficient corresponding microscopic marks of value.

A pattern examination of the Item [#} cartridge case and Item [#] pistol was inconclusive due to a lack of sufficient corresponding microscopic marks of value.

A pattern examination of toolmarks present on the Item [#} padlock and [#] drill bit was inconclusive due to a lack of sufficient corresponding microscopic marks of value.

A pattern examination of toolmarks present on the Item [#} and Item [#] was inconclusive due to a lack of sufficient corresponding microscopic marks of value.

Elimination

The [#] bullet was excluded as having been fired from the barrel of the [#] pistol.

The [#] cartridge case was excluded as having been fired in the [#] pistol.

The [#] through [#] drill bits have a cutting diameter consistent with ¼ inch drill bits or larger and therefore were excluded as having created the toolmarks present on the [#] lock.

The [#] and [#] PVC pipes were excluded as having been cut by the same tool.

Bunter Marks

Due to many unknown variables in ammunition manufacturing and distribution, no conclusive determination could be made for whether the [Item #] cartridge cases originated from the same box of ammunition as the [Item #] cartridges.

This result limits the number of ammunition boxes from which [Item #] could have originated. However, due to unknown variables in ammunition manufacturing and distribution, it cannot be conclusively determined to what degree this result limits the number of possible boxes of origin.

Extrusion Marks

The Item [#] tubes/pipes bear manufacturing toolmarks along their length that are consistent with having been produced by an extrusion manufacturing method. These toolmarks were identified as having been produced by the same tool. This indicates that the Item [#] tubes/pipes share a common source. However, due to unknown variables in tube/pipe manufacturing, it cannot be determined whether the tubes/pipes were cut from one piece of stock or multiple pieces, and there is currently no known method to predict or determine how long these marks may persist during manufacture.

Manufacturing Marks (mold marks)

The Item [#] and [#] [item description] bear manufacturing toolmarks that are consistent with having been produced by a mold. These toolmarks were identified as having been produced by the same tool. This indicates that the Item [#] and [#] share a common source. However, due to unknown variables in injection molding manufacturing, there is currently no known method to predict or determine how long these marks may persist during manufacture, or how many items may be produced from a mold.

Pattern Examination (Methods and Limitations)

Methods:

Pattern Examination

Toolmarks, whether they are present on evidence items or secondary evidence created in the Laboratory, undergo two stages of comparison. First, the class characteristics are reviewed and compared. If the class characteristics of the toolmarks are not clearly different, the examination moves to a second stage using comparative microscopy.

A microscopic comparison examination consists of a search of the impressed and striated marks present in two toolmarks to determine if patterns of similarity exist. At the completion of these comparisons, one of the following three opinions is issued:

1) Source Exclusion

Source exclusion is an Examiner's conclusion that two toolmarks did not originate from the same source. This conclusion is an Examiner's opinion that the observed difference(s) in class characteristics provides extremely strong support for the proposition that the two toolmarks came from different sources and extremely weak or no support for the proposition that the two toolmarks came from the same source. A source exclusion based on a minor difference in measured class characteristics requires a verification.

2) Source Identification

Source identification is an Examiner's conclusion that two toolmarks originated from the same source. This conclusion is an Examiner's opinion that all observed class characteristics are in agreement and the quality and quantity of corresponding individual characteristics is such that the Examiner would not expect to find that same combination of individual characteristics repeated in another source. The basis for a source identification conclusion is an Examiner's opinion that the observed class characteristics and corresponding individual characteristics provide extremely strong support for the proposition that the two toolmarks originated from the same source and extremely weak support for the proposition that the two toolmarks originated from different sources. A source identification requires a verification and is the Examiner's opinion that the probability that the two toolmarks were made by different sources is so small that it is negligible.

3) Inconclusive (No Conclusion)

Inconclusive is an Examiner's conclusion that all observed class characteristics are in agreement but there is insufficient quality and/or quantity of corresponding individual characteristics such that the Examiner is unable to identify or exclude the two toolmarks as having originated from the same source. This conclusion is an Examiner's opinion that there is an insufficient quality and/or quantity of individual characteristics to identify or exclude. Reasons for an inconclusive conclusion include the presence of microscopic similarity that is insufficient to form the conclusion of source identification, or a lack of any observed microscopic similarity.

Limitations:

<u>Pattern Examination</u>

Firearms/Toolmark Identification is an empirical science that relies on objective measurements and a subjective comparison of microscopic marks of value. Due to variation in

substrate, changes in tool working surfaces from wear, corrosion, and damage, or the employment of unusual tool/work piece orientations, it may not be possible for an Examiner to reach a source conclusion. Additionally, some tool manufacturing methods routinely produce working surfaces that leave limited microscopic marks of value. Damaged, corroded, or fragmented items may be of little or no value for comparison purposes.

Virtual Comparison Microscopy

Virtual comparison microscopy (VCM) is restricted to the surface that a three-dimensional toolmark topographical instrument is capable of measuring to produce a digital reproduction. Additionally, individual characteristics may be present on the evidentiary item but may not be reproduced during a scan. This may be due to interference from lacquer/sealant, environmental damage, debris, or measuring limits for an instrument. Furthermore, physical characteristics that are not measurable, such as the metallic qualities of an item, may not be available for evaluation in the digital reproduction.

Bunter Mark Examination

Please note that no known method exists for accurately assessing the probability that these cartridges originated from the same box of ammunition.

Reference Ammunition File (Results)

Reference Ammunition File (RAF) Examination

[#] is a .38 caliber/9mm full metal jacketed bullet fired from a barrel rifled with 8 lands and grooves, right twist. The weight and design characteristics of the [#] bullet are consistent with bullets typically loaded in .38 Special caliber cartridges, although other possibilities could not be eliminated. A search of the FBI Laboratory's Reference Ammunition File (RAF) located a sample with a bullet of similar weight and design. This .38 Special caliber ammunition is sold under the trade name Remington UMC and bears product code L38S11.

Reference Ammunition File (Methods and Limitations)

Methods:

Reference Ammunition File

The weight and design characteristics of submitted bullets are searched against the RAF database to determine possible manufacturer and trade name information.

Limitations:

Reference Ammunition File

The RAF database contains information obtained from ammunition purchased by the FBI Laboratory and is not a comprehensive representation of all types of ammunition present in the general public. Therefore, the results of RAF searches may not include the actual brand and type of ammunition represented by the questioned item.

Serial Number Restoration (Results)

Partial Restoration

Examination and processing of the obliterated [area or serial number] on the [#] pistol restored the [area or serial number] to read "*702182." The asterisk represents a character that was partially restored but could not be conclusively determined. The Bureau of Alcohol, Tobacco and Firearms Serial Number Structure Guide indicates that the first character on firearms like the [#] pistol is typically a "T".

The examination and processing of the obliterated serial number on the [#] pistol was partially restored to read "77?*182". The question mark represents a character that could not be determined. The asterisk represents a number that was partially restored and is most likely a "2" or a "7".

Complete Restoration

The examination and processing of the obliterated serial number on the [#] pistol was restored to read "7702182".

Negative Restoration

The examination and processing of the obliterated serial number was unsuccessful in restoring the serial number on the [#] pistol.

Serial Number Restoration (Methods & Limitations)

Methods:

Serial Number

Magnetic, thermal, and chemical methods may be used for the restoration of serial numbers. Conclusions regarding restored characters are made by visual examination of the restored surface under a variety of lighting conditions. Information regarding the alpha-numeric

structure or the general location of serial numbers is obtained when necessary from reference sources or from firearms in the Laboratory's Reference Firearms Collection.

Limitations:

Serial Number

Except for the magnetic method, serial number restoration is a destructive examination and it is possible that the obtained results may not be reproduced in any subsequent examinations. Restored serial numbers are sometimes only visible during a portion of the reconstruction process, and are not necessarily visible at the conclusion of the process.

Trajectory Examinations (Results)

Predicated on a request to the Laboratory Division from [name], a Laboratory Shooting Reconstruction Team (LSRT) was deployed to [location], on [date] to perform a Shooting Incident Reconstruction (SIR). The members of the LSRT were Physical Scientist/Forensic Examiner [name], Visual Information Specialist [name] of the Operational Projects Unit, and Supervisory Special Agent [name] of the Evidence Response Team Unit. These examinations were conducted on [date] at the [address].

Graphical depictions of the results of SIR examinations have been prepared by the Laboratory Division's Operational Projects Unit and are included in this report.

(Optional) For the purpose of this report [insert identifier] represents holes that were generated when a bullet and/or debris punctured an object. The letter [insert identifier] represents impacts that were generated when a bullet and/or debris struck an object.

(Optional) For the purpose of this report the origin of a trajectory will be referred to by compass direction.

(Optional) For the purpose of this report the origin of a trajectory will be referred to by vehicle quadrants.

(Optional) Information regarding the locations of the vehicles at the shooting scene was provided to the Operational Projects Unit by [name] and was not determined through Laboratory examination.

Black and White Dodge Monaco

Five bullet trajectories were reconstructed, with two originating from the front-driver quadrant and three from the front-passenger quadrant. Four additional holes/impacts (three exterior, one interior) could not be associated with a specific trajectory.

Red Chevrolet

Four bullet trajectories were reconstructed, with all of them originating from the rear-driver quadrant. One additional hole in the windshield could not be associated with a specific trajectory but has damage consistent with the passage of a bullet from the inside of the vehicle to the outside.

Results of Examinations near 1060 West Addison Street:

Two bullet trajectories were reconstructed on the exterior of Wrigley Field immediately adjacent to the left field bleachers above Waveland Avenue. These trajectories come from the direction of the seating area on the roof of the apartment building at 1049 Waveland Avenue. Three additional holes consistent with having been caused by a bullet were examined but were unsuitable for trajectory reconstruction or directional determinations.

Trajectory Examinations (Methods & Limitations)

Methods:

Vehicle Examinations

For manual measurements, a Cartesian coordinate system is established by using tape measures to create an x-y dimension grid around the vehicle. A series of 3-D measurements (x,y,z) is recorded that establishes the vehicle's basic dimensions and its location within the grid. Points of interest (suspected bullet holes or impacts) on the exterior or in the interior of the vehicle are identified and labeled. These holes and impacts are examined to determine whether they have physical effects consistent with having been caused by a bullet. They are then examined to determine specific trajectories (holes caused by the same bullet) and to identify the direction the bullet was traveling. The direction of travel can be determined by the nature of the damage around the hole(s), the direction of transport of additional materials from a hole, the lack of an exit hole on one end of the trajectory, or by the recovery of a bullet or bullet fragments at one end of the trajectory. Holes and impacts of importance are labeled and measured from a position within the grid system. Manual measurements may be supplemented with or replaced by data from surveying equipment or laser scanning devices operated by the Operational Projects Unit.

Non-vehicle Examinations

Areas of interest for Shooting Incident Reconstruction are measured and/or surveyed and documented to allow for 3-D computer reconstruction of the shooting scene. Suspected bullet holes/impacts are examined to determine whether they have physical effects consistent with having been caused by a bullet and/or debris. They are then examined to determine specific trajectories (holes caused by the same bullet) and to identify the direction the bullet was traveling. The direction of travel can be determined by the nature of the damage around the

hole(s), the direction of transport of additional materials from a hole, the lack of an exit hole on one end of the trajectory, or by the recovery of a bullet or bullet fragments at one end of the trajectory. For manual measurements, coordinate systems are established within the shooting scene to allow for all holes/impacts of importance to be measured within the overall scene. Manual measurements may be supplemented with or replaced by data from surveying equipment or laser scanning devices operated by the Operational Projects Unit.

Trajectory Examinations

Trajectories can be determined by either measuring the (x,y,z) coordinates of at least two points along each trajectory, or by measuring the position of one hole/impact and taking horizontal angle (azimuth) and vertical angle (declension) measurements of the trajectory rods. Measurements are acquired through various equipment, some maintained by the Operational Projects Unit.

Limitations:

Trajectory Examinations

Due to vehicle glass breakage, bullet fragmentation, bullet deflection, intervening objects, mobile objects, and scene variants, trajectory determination may be unsuccessful. Consequently, the number of reconstructed trajectories may not indicate the total number of shots fired. Trajectory determination involving a wound and/or injury are outside the scope of the firearms/toolmarks discipline.

Silencer/Suppressor (Results)

Visual examination of silencer/suppressor with no test firing

[#] is a silencer (suppressor) with the design and components for diminishing the report of a firearm.

Silencer/Suppressor test with no reported quantitative decibel reduction

[#] is a silencer (suppressor) with the design and components for diminishing the report of a firearm. The [#] silencer is threaded and will attach to the muzzle of the [#] pistol. When the [#] pistol was test fired in the Laboratory using the [#] silencer, an audible difference with and without the silencer was produced.

Silencer/suppressor test with reported quantitative decibel reduction

[#] is a silencer (suppressor) with the design and components for diminishing the report of a firearm. The [#] silencer is threaded and will attach to the muzzle of the [#] pistol. Sound attenuation tests were conducted by firing the [#] pistol using the [#] silencer. An average sound

reduction of approximately [number] decibels (+/- [0.00] dB, k=3 for a 99.73% confidence level) was measured using the [#] silencer with the [#] pistol.

Silencer/Suppressor (Methods & Limitations)

Methods:

Silencer

Silencers are visually inspected to determine if they can be classified as a silencer by design. Reference material is used to assist in this determination and the use of an X-ray machine allows for an internal inspection of a silencer.

(Quantitative Result) Sound attenuation tests are conducted using a decibel meter. The mean and the uncertainty (three standard deviations) are calculated after measuring a minimum of ten shots with and without the silencer.

Limitations:

Silencer

Physical sound attenuation tests conducted in the FBI Laboratory are intended to determine if there was audible difference with and without the use of a silencer. These tests are not intended to quantify the reduction in sound.

(Quantitative Result) Sound attenuation tests conducted in the FBI Laboratory are not intended to measure an absolute value for sound reduction, but rather the measured difference with and without a silencer installed.

Tool (Results)

[#] is a [brand/manufacturer] [type of tool], that uses a [insert type of action].

[#] is a [brand/manufacturer] [type of tool].

Tool (Methods & Limitations)

Methods:

Tool

The type, action, and manufacturer of a tool are normally determined by directly observing the function and manufacturer markings on the tool in question. When these are not present, published materials and tool literature in the Firearms/Toolmarks Discipline reference

library may be used to make determinations. When a microscopic comparison is necessary using a questioned tool, test samples are created using a test material that is softer or similar in quality to the item being compared.

Limitations:

Tool

The results of tool examinations describe type and/or operating condition of the tool as it was received in the Firearms/Toolmarks Discipline.

Administrative Section of Laboratory Report

Follow Up Report

This report is a follow-up to an FBI Laboratory Report [Laboratory #] dated [date]. The results of the [examination type] examination[s] are included in this report.

Introduction Sentences

The results of the [type] examinations are included in this report.

The results of the [type] examinations and national database searches are included in this report.

Listing Combined Report

The items listed below were submitted under cover of communication dated [date] in FBI Case ID [ ] and assigned Laboratory number [#]:

Remarks Section of Laboratory Report

Defense Systems Unit Assisted Examinations

The requested [examination] of the [#] [pistol] cannot be performed at the FBI Laboratory due to a lack of the appropriate expertise and equipment. Arrangements have been made to have this test performed by the Defensive Systems Unit of the FBI Training Division. Any questions about this test or requests for testimony regarding the results of this test should be directed to Defensive Systems Unit personnel, [phone number].

To facilitate the requested [examination], the [Item #] was test fired at the Ballistic Research Facility of Defensive Systems Unit, Training Division. The [Item #] was fired using the attached [list accessories] provided by the Ballistic Research Facility. The shooting was

performed by [name] of the Ballistic Research Facility, who can be contacted for information about the results of these tests or for any further shooting accuracy requests.

Discontinued Examination/Request

Per communication with [title] [name] on [date], the [type] examinations were discontinued and the Item [#] will not be examined at the FBI Laboratory.

Per email communication between [name] and [title] [name] on [date], the request for [type] examination has been discontinued.

Appendix B: *FTD Technical & Administrative Review Form*

Redacted - Form on File

Appendix B: *FTD Technical & Administrative Review Form* continued

Redacted - Form on File

Appendix C: *FTD i3 Product Form*

Redacted - Form on File